NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

COVER CROP (ACRE)

CODE 340

DEFINITION

Grasses, legumes, forbs, or other herbaceous plants established for seasonal cover and conservation purposes.

PURPOSES

- Reduce erosion from wind and water
- Increase soil organic matter
- Manage excess nutrients in the soil profile
- Promote biological nitrogen fixation
- Increase biodiversity
- Weed suppression
- Provide supplemental forage
- Soil moisture management
- **Increase soil nutrients**

CONDITIONS WHERE PRACTICE APPLIES

On all lands requiring vegetative cover for natural resource protection.

CRITERIA

General Criteria Applicable To All Purposes

Plant species, seedbed preparation, seeding rates, seeding dates, seeding depths, and planting methods will be consistent with approved local criteria and site conditions.

Seedbed preparation and seeding depths will follow criteria set forth in the Field Office Technical Guide (FOTG), Section IV—Practice Standards and Specifications, 512–Pasture/Hayland Planting.

Cover Crops will be established according to species and associated seeding rates and planting dates appropriate for Montana. Additional species may be approved by the State Resource Conservationist through written variance.

The species selected will be compatible with the nutrient management and pest management provisions of the plan.

Cover crops may be incorporated or managed as residues on the soil surface depending on the resource concern.

Cover crops will be terminated by harvest, frost, mowing, tillage, and/or herbicides in preparation for the following crop.

Herbicides used with cover crops will be compatible with the following crop.

Cover crop residue will not be burned. **Utilization of cover crops and timing of cover termination will be compatible with other program requirements including compliance requirements contained in the Food Security Act of 1985 as amended by 1990 FACTA.**

Additional Criteria to Reduce Erosion From Wind and Water

Cover crop establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s).

NRCS, MT
September 2001

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard contact the Natural Resources Conservation Service.

NOTE: This type of font **(AaBbCcDdEe 123..)** indicates NRCS National Standards.
This type of font (AaBbCcDdEe 123..) indicates Montana Supplement.

Plants selected for cover crops will have the physical characteristics necessary to provide adequate protection.

The amount of surface and/or canopy cover needed from the cover crop shall be determined using current erosion prediction technology **(RUSLE, WEQ, and FOTG, Section I—Erosion Prediction).**

Additional Criteria to Promote Biological Nitrogen Fixation

The specific Rhizobia bacteria will either be present in the soil or the seed will be inoculated at the time of planting legumes.

Nitrogen credits from legume cover crops will be accounted for in the nutrient management plan.

Nitrogen is the primary element managed for nutrient additions to the soil by the use of cover crops. To add nitrogen, choose a crop that fixes N and grows vigorously. Legumes must be inoculated with appropriate Rhizobium bacteria for best results.

Incorporate before bloom when foliage is green and succulent.

Grass cover crops do not fix nitrogen and may actually tie up soil nitrogen temporarily when turned under. Fall seeded legumes are slow to develop in the fall but grow rapidly the following spring, providing nitrogen and biomass by summer.

Additional Criteria to Manage Excess Nutrients in the Soil Profile

Cover crops will be established and actively growing before expected periods of high precipitation that can cause leaching.

Cover crop species will be selected for their ability to absorb large amounts of nutrients from the rooting profile of the soil.

Select a crop that is efficient at scavenging a particular nutrient or able to grow when residual N is still in the field. Common species include brassicas (oilseed mustard, white mustard), spring grains (oats, barley), winter grains (fall rye), grasses (annual ryegrass), and herbs (buckwheat).

The aboveground biomass will be removed from the field for maximum nutrient removal efficiency.

Additional Criteria to Increase Soil Organic Matter

Cover crop species will be selected on the basis of producing high volumes of organic material to maintain or improve soil organic matter.

The NRCS Soil Conditioning Index (SCI) procedure will be used to determine the amount of biomass required.

The cover crop will be terminated **at full bloom or** as late as feasible to maximize plant biomass, **while retaining adequate soil moisture** and still prepare the seedbed for the subsequent crop.

Additional Criteria to Increase Biodiversity

Cover crop species shall be selected that, have different maturity dates, attract beneficial insects, serve as a trap crop for damaging insects, and/or provide food and cover for wildlife habitat management.

Incorporate cover crop before bloom when foliage is green and succulent to increase biological activity.

Additional Criteria for Weed Suppression

Species for the cover crop will be selected for their chemical or physical competition with weeds.

Use crops such as annual grasses and fall-planted brassicas that establish themselves quickly and develop a spreading fibrous root.

Cover crops residues will be left on the soil surface to maximize allelopathic (chemical) and mulching (physical) effects.

For long-term weed suppression, perennials and/or biennial species can be used. **Fall-planted cover crops are more competitive with spring weeds than are spring-planted cover crops.**

Additional Criteria to Provide Supplemental Forage

Species selected will have desired forage traits, be palatable to livestock, and not interfere with the production of the subsequent crop.

Forage provided by the cover crop may be hayed or grazed as long as sufficient biomass is left for resource protection.

Additional Criteria for Soil Moisture Management

Terminate growth of the cover crop sufficiently early to conserve soil moisture for the subsequent crop.

Cover crops established for moisture conservation shall be left on the soil surface until the subsequent crop is planted.

In areas of potential excess soil moisture, allow the cover crop to grow as long as possible to optimize soil moisture removal.

CONSIDERATIONS

Cover crops are grown primarily to protect and improve the soil, not to harvest (except as a secondary forage benefit). Cover crops have the potential to improve soil tilth, control erosion and weeds, and maintain organic matter. They can also reduce compaction and increase water infiltration, which decreases leaching of nutrients. Cover crops retain and recycle plant nutrients (especially nitrogen) between crops, provide habitat beneficial to microorganisms, and increase plant diversity.

There are many ways to use cover crops in a production cycle including:

- **As a companion crop or living mulch, the cover is planted between rows of a cash crop.**
- **As a "catch" crop for nutrients, planted after harvest of the main crop or between the rows of the cash crop to reduce leaching of nutrients.**
- **As an off-season crop grown to protect the soil during critical erosion periods (most common use).**

Cover crops must be correctly selected and managed. There are many possible crops, each of which differs in potential benefits and in adaptability to particular climates and rotational schemes. The most commonly used cover crops are annual grasses and legumes, but perennials and biennials can also be used.

Low moisture levels may prohibit establishing a cover crop in July or August. Monitor moisture levels prior to planting.

The cover crop should be terminated as late as feasible to maximize plant growth **while retaining adequate soil moisture** and still prepare the seedbed for the subsequent crop.

Consider termination of the cover crop prior to seed head development to ensure that cover crop does not become a weed for subsequent crops.

When managing for soil nutrient additions, the best time to incorporate leguminous cover crops is the period just before or at full bloom. This ensures decomposition and nutrient release over a longer period of time (versus termination prior to bloom).

Incorporating at full bloom will result in better aeration of poorly drained soils and high C:N ratios which slow decomposition and delay nutrient availability for the following crop.

Deep-rooted species provide maximum nutrient recovery.

Consider that grasses utilize more soil nitrogen, and legumes utilize both nitrogen and phosphorus.

Avoid cover crop species that attract potentially damaging insects. **To eliminate potential insect or disease infestations associated with growing green tissue (the green bridge) cover crops should be terminated at least two-three weeks prior to planting the next crop.**

Acceptable benefits, for most purposes, are usually accomplished when the plant density is at least 25 stems per foot, the combined canopy and surface cover is at least 60 percent, and the above ground (dry weight) biomass production is at least 2,700 lb/acre.

Cover crops may be used to improve site conditions for establishment of perennial species.

Weeds are suppressed within cover crops during germination and establishment, while the cover is growing, or following desiccation and kill. Covers such as small grains that germinate and emerge rapidly before weeds grow will suppress the greatest percentage of weeds.

Mixtures of cereals and legumes will reduce weed growth and potential infestations compared to legumes alone.

The time of planting somewhat defines the choice of cover crops. For example, buckwheat is killed by light frosts and can only be planted in the summer. Brassicas and spring grains are all killed during the winter. Grains and grasses can all be planted in late summer to early fall. This will give them enough time to grow enough to take up nutrients, but not enough time to set seed. Fall rye can be planted into the autumn.

PLANS AND SPECIFICATIONS

Plans and specifications will be prepared for the practice site. Specifications will include, but are not limited to, recommended species, seeding rates and dates, establishment methods, nutrients needed, and other establishment information. Specifications can be recorded in narrative format, on job sheets, or forms designed to provide specific requirements for the practice. **The Cover Crop specification is required for implementation of this practice.**

A cover crop practice establishment plan shall include the following information:

1. **Location field numbers and a map or sketch of the area to be established.**
2. **Measured acres.**
3. **Date practice scheduled and applied.**
4. **Species to be planted, (TABLE 1) associated with planned residue amounts, percent surface cover, and orientation.**
5. **Critical time periods to maintain cover.**

The Montana Cover Crop Specification is applicable to this practice and is required.

OPERATION AND MAINTENANCE

Control growth of the cover crop to reduce competition from volunteer plants and shading.

Control weeds in the cover crop by mowing or herbicide application.

REFERENCES:

Specialty Crops: Guildelines. Montana State University Cooperative Extension Service Don Baldridge, 1990.

Pulse Production Manual. Saskatchewan Pulse Growers, April 2000.

On-Farm Research into Reducing Nutrient Loss. Nova Scotia Organic Growers Association. May 1998.

Cover Crops and Living Mulches. North Carolina State University Cooperative Extension Service, Sustainable Production Techniques. July 1997.

NATURAL RESOURCES CONSERVATION SERVICE

COVER CROP (ACRE)

CODE 340

MONTANA CONSERVATION PRACTICE SPECIFICATION / JOB SHEET

PRODUCER	TRACT / FIELD NUMBER / CTU	ACRES

SCOPE: Cover Crops are grown to protect and improve the soil. Cover crops can improve soil tilth, control erosion and weeds, and maintain or improve organic matter. They can reduce compaction and increase water infiltration which decreases leaching of nutrients. Cover corps retain and recycle plant nutrients, provide habitat for beneficial microorganisms, and increase plant diversity. This specification provides guidelines for establishment and maintenance of cover crops.

PURPOSE OF PLANTING:

- ❑ reduce erosion from wind or water
- ❑ increase soil organic matter
- ❑ provide supplemental forage
- ❑ promote biological fixation
- ❑ manage excess nutrients
- ❑ soil moisture management
- ❑ increase biodiversity
- ❑ weed supression
- ❑ increase soil nutrients

1. **Soil Map Unit(s)** _____

2. **Planting Date**: between _____ and _____

3. **Seedbed preparation**: Prepare firm, weed-free seedbed. Cultivate seedbed and leave firm so that an average person tracks are not more than 3/8" deep. No-till planting may also be completed.

4. **Fertilization**: Apply fertilizer according to recommendations (EB104 Fertilizer Guidelines). Incorporate into seedbed. _____ Lbs/ac N, _____ Lbs/ac P_2O_5, _____ Lbs/ac K_2O.

5. **Seeding**

   a. (1) Plant single species:

   _____ (species) at _____ Lbs. PLS/ac X _____ = Total Lbs. PLS

   OR

   (2) Plant mixture:

   _____ (species) at _____ Lbs. PLS/ac X _____% in mix X _____acres = _____

   _____ (species) at _____ Lbs. PLS/ac X _____% in mix X _____acres = _____

   Total Lbs PLS _____

PLANTING METHODS:

Drill grass and/or legume cover crop no more than 3/8 inch deep uniformly over area. Crops should be planted at depths appropriate for the specific species. Establish stand of vegetation according to recommended seeding rate. Control pests according to 595 Pest Management.

OPERATION & MAINTENANCE:

Perform all seedbed preparation and planting operations in a manner that will minimize erosion until cover establishment. Control weeds in the cover crop by mowing or herbicide application. Terminate cover crop as late as possible to maximize plant growth while retaining adequate soil moisture for the subsequent crop. To avoid potential insect or disease infestations associated with green tissue, terminate cover crop at least two-three weeks prior to planting the next crop.

TABLE 1. Cover Crop Seeding Rates.*

SPECIES	DRILLED SEEDING RATES (LBS/AC PLS) DRYLAND	IRRIGATED
SMALL GRAINS		
Barley	15	20
Oats	20	30
Winter Wheat	20	30
Rye	10	15
ANNUAL GRASSES		
Sudangrass	10	15
Foxtail millet	7	12
Sorghum	10	20
Annual Ryegrass	20	25
Fall Cereal Rye	25	35
LEGUMES		
Alfalfa	5	6
Lentils	15	20
Austrian Winter Peas	20	30
Sweet Clover	5	8
Faba beans	25	35
Red Clover	4	6
Hairy Vetch	30	40
Subterranean Clover	15	20
OTHERS		
Buckwheat	15	20

* Cover crop species can have a wide range of seeding dates ranging from spring to fall depending on specific use and climatic conditions. Generally soil moisture must be apparent within the top 2 inches of soil to ensure planting success. (See FOTG Standard 512–Pasture/Hayland Planting)